

## ABSTRACT

A process and structure for copper damascene interconnects including a tungsten-nitride ( $\text{WN}_2$ ) barrier layer formed by atomic layer deposition is disclosed. The process method includes of forming a copper damascene structure by forming a  
5 first opening through a first insulating layer. A second opening is formed through a second insulating layer which is provided over the first insulating layer. The first opening being in communication with the second opening. A tungsten-nitride ( $\text{WN}_2$ ) layer is formed in contact with the first and second openings. And, a copper layer is provided in the first and second openings. Copper is selectively deposited  
10 using a selective electroless deposition technique at low temperature to provide improved interconnects having lower electrical resistivity and more electro/stress-migration resistance than conventional interconnects. Additionally, metal adhesion to the underlying substrate materials is improved and the amount of associated waste disposal problems is reduced.

"Express Mail" mailing label number: EL671639742US

Date of Deposit: July 9, 2001

This paper or fee is being deposited on the date indicated above with the United States Postal Service pursuant to 37 CFR 1.10, and is addressed to the Commissioner for Patents, Box Patent Application, Washington, D.C. 20231.

---